

UNIVERSITY OF CALGARY  
DEPARTMENT OF CHEMISTRY  
**COURSE SYLLABUS**  
FALL 2016

**COURSE: CHEMISTRY 331, Inorganic Chemistry: Main Group Elements**

LEC	DAYS	TIME	ROOM	INSTRUCTOR	OFFICE	PHONE	EMAIL	OFFICE HOURS
L01	MWF	13:00-13:50	ST 141	Dr. R. Roesler	SB 339	220-5366	<a href="mailto:roesler@ucalgary.ca">roesler@ucalgary.ca</a>	M 14:00 - 15:00 W 14:00 - 15:00

Desire 2 Learn (D2L) course name: <https://d2l.ucalgary.ca/d2l/home/156703>

Departmental Office: SA 229, 220-5341, [chem.undergrad@ucalgary.ca](mailto:chem.undergrad@ucalgary.ca)

**TEXTBOOK:** Gary L. Miessler, Paul J. Fischer, Donald A. Tarr., "Inorganic Chemistry", Pearson, Fifth Edition (2014).

**TOPICS COVERED AND SUGGESTED READING:**

<b>COURSE CONTENTS</b>	<b>Lectures<sup>a</sup></b>	<b>Chapter in Textbook</b> <i>(not all sections will be covered)</i>
<b>ORIGIN OF THE ELEMENTS</b>	1	N/A
<b>ELECTRONIC STRUCTURE OF THE ATOM</b>	2, 3	Chapter 2
Basics Atomic Orbitals Penetration and Shielding Periodic Trends		
<b>BONDING MODELS: DISCRETE STRUCTURES</b>	4 through 7	Chapter 3
Lewis Structures VSEPR Theory Valence Bond Theory Molecular Orbital Theory: Diatomic Molecules		
<b>BONDING MODELS: MOLECULAR SYMMETRY</b>	8 through 12	Chapter 4, 5
Symmetry Operations and Symmetry Elements Point Groups and Group Theory Vibrational Spectroscopy Molecular Orbital Theory: Polyatomic Molecules		
<b>BONDING MODELS: EXTENDED STRUCTURES</b>	13 through 17	Chapter 7
Packing of Spheres The Unit Cell Metallic and Ionic Lattices Semiconductors: Band Theory Lattice Energy Born-Haber Cycle		
<b>MAIN GROUP ELEMENTS: GENERAL PRINCIPLES</b>	18, 19	N/A
Electronegativity Valence Oxidation number/state Coordination Number		

d- and f-Block Contraction

**CHEMISTRY OF THE MAIN GROUP ELEMENTS**

20 through 32

**Group 1**

Hydrogen

Chapter 8

Alkali Metals

Chapter 8

Complex Ions: Crown Ethers and Cryptands

Lithium Batteries: Primary and Secondary

Group 2

Chapter 8

Water Hardness

Group 13

Chapter 8

Boron

Electron Deficient Compounds

Lewis Acidity

Positive Hyperconjugation

Boranes and Carboranes

Wade-Mingos Rules

Al, Ga, In, Tl

Chapter 8

Inert pair Effect

Chemical Vapor Deposition

Group 14

Chapter 8

Carbon Allotropes

Si, Ge, Sn, Pb

Hypervalent Compounds

Semiconductor Grade Silicon

Negative Hyperconjugation

Group 15

Chapter 8

Nitrogen

P, As, Sb, Bi

Lewis Basicity

Multiple bonds to oxygen

Group 16

Chapter 8

Oxygen

S, Se, Te, Po

Group 17

Chapter 8

Group 18

Chapter 8

Xenon

<sup>a</sup> The number of lectures allocated to each topic is TENTATIVE